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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,426	09/12/2003	Jen Sheen	00786/397003	9364

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EXAMINER	
KUBELIK, ANNE R	

ART UNIT	PAPER NUMBER
1638	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/661,426	SHEEN ET AL.	
	Examiner	Art Unit	
	Anne R. Kubelik	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) *8 and 11-40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election with traverse of Group I and MKK4 in the reply filed on 30 May 2006 is acknowledged. The traversal is on the ground(s) that MAKK proteins are conserved among species, and a search of one MAPKK kinase domain should identify other MAPKK kinase domains. This is not found persuasive because a search of one MAPKK kinase domain will not find all art on other MAPKK kinase domains. Applicant urges that MKK4 and MKK5 are 82% identical and conserved among many plant species. This is not found persuasive because a search on MKK4 will not find all art on MKK5. .

The requirement is still deemed proper and is therefore made FINAL.

Claims 8 and 11-40 are withdrawn from consideration as being drawn to nonelected inventions.

2. This application contains sequence disclosures that are encompassed by the definitions for nucleotide and/or amino acid sequences set forth in 37 CFR 1.821(a)(1) and (a)(2). However, this application fails to comply with the requirements of 37 CFR 1.821 through 1.825.

Sequence identifiers are missing from either the Brief Description or the legend of Fig. 2.

Full compliance with the sequence rules is required in response to this Office action. A complete response to this Office action must include both compliance with the sequence rules and a response to the issues set forth herein. Failure to fully comply with both of these requirements in the time period set forth in this Office action will be held to be non-responsive.

3. Figures 15-16 are objected to because tables and sequence listings that are included in the specification are, except for applications filed under 35 U.S.C. 371, are not permitted to be included in the drawings. See 37 CFR 1.83 (a).

4. Figures 4-8 are objected to because letters under the black boxes cannot be read. Figures 21A and F are objected to because no details can be made out in the black boxes.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-7 and 9-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding constitutively activated *Arabidopsis* MKK4, does not reasonably provide enablement for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims are broadly drawn to a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain.

The instant specification, however, only provides guidance for induction of defense gene promoters/luciferase constructs in *Arabidopsis* protoplasts by Flg22, the first 22 amino acids of eubacterial flagellins (example 2); analysis of WRKY29 induction in thee protoplasts (example 3); analysis of the effect of constitutively active ANP1 and MEKK1 (both MAPKKKs) on PAL1, GST1 and WRKY29 promoters (example 4); analysis of the effect of constitutively active MKK4 and MKK5 (both MAPKKs) on PAL1 and WRKY29 promoters (example 5); analysis of

the transcriptional control of the WRKY29 promoter to show that WRKY29 induces its own expression (example 6), *Arabidopsis* leaves transiently expressing WRKY29 have reduced Pseudomonas susceptibility (example 7); analysis of early defense transcription by flg22 in *Arabidopsis* leaf cells (example 8); determination that flg22 acts through fls2 (example 9); transient expression of mouse MAPK phosphatase to partially block WRKY29 and FRK1 promoter activation, and treatment of protoplasts with flg22 to identify protein kinases activated in *Arabidopsis* - MPK3 and MPK6 were activated but not others (example 10), analyses of 4 of the 9 *Arabidopsis* MAPKKs to determine that constitutively activated MKK4 and MKK5, but not constitutively activated MKK1 and MKK2, are able to phosphorylate and activate MPK3 and MPK6 in a transient expression assay and that constitutively activated MKK4 and MKK5 also activate the WRKY29 and FRK1 promoters, but not the GST1 promoter (example 11); analysis of 4 of the 25 *Arabidopsis* MAPKKKs to determine that constitutively activated MEKK1 but not constitutively activated CTR1 and EDR1 activate MKK5 and that constitutively activated ANP1 activated it only marginally (example 12); determination that WRKY regulates its own promoter (example 13); and leaves expressing constitutively activated MEKK1, MKK4, MKK5 or wild-type WRKY29 had enhanced resistance to Pseudomonas and Botrytis (example 14). prophetic guidance is given for isolation of other MAPKKKs, MAPKKs and WRKYs and expression of the proteins or their kinase domains in plants (pg 33-48).

The instant specification fails to provide guidance for a method of enhancing pathogen resistance in a plant by transformation with a nucleic acid encoding any MAPKK kinase domain

Not all MAPKKs will function in the claimed invention. The specification teaches that half of the four tested MAPKKs did not function to activate pathogen resistance genes (example

11). Matsuoka et al (2002, Plant J. 29:637-647) teach that the Arabidopsis MAPKK AtMEK1 has a distinct substrate specificity and only poorly activated MPK3 (paragraph spanning pg 640-641).

Nucleic acid encoding MAPKKs that are not constitutively activated will not function in the claimed invention. Xing et al (2001, Plant Mol. Biol. 46:109-120) teach that the non-constitutively activated form of the MAPKK, tMEK2, did not activate pathogenesis genes (pg 144, left column, paragraph 2). Further, the specification states "MAPKKs require phosphorylation to be activated" (pg 24, lines 10-11).

Nucleic acids encoding only the kinase domain of a MAPKK are unlikely to work in the claimed invention, as regions outside the kinase domain are involved in MAPK binding (Fukuda et al, 1997, EMBO J. 16:1901-1908).

Lastly, nucleic acids encoding non-plant MAPKKs are unlikely to work in the claimed invention, given the substrate specificity of MAPKKs.

Given the claim breath, unpredictability in the art, undue experimentation, and lack of guidance in the specification as discussed above, the instant invention is not enabled throughout the full scope of the claims.

7. Claims 1-7 and 9-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

A full review of the specification indicates that nucleic acids encoding MAPKK domains that enhance resistance of plants to pathogens are essential to the operation of the claimed invention. The claims, however, are drawn to methods comprising transforming plants with nucleic acids encoding any MAPKK domain.

The level of skill and knowledge in the art at the time of filing was such that a number of MAPKKs were known, but only two of these have been shown to enhance resistance of plants to pathogens.

The specification describes no structural feature that distinguishes MAPKKs that enhance resistance of plants to pathogens from those that do not. The necessary and sufficient structural elements of a MAPKK that enhances resistance of plants to pathogens are not described.

The only species described in the specification are MKK4 and MKK5.

Since the disclosure fails to describe the common attributes that identify members of the genus, and because the genus is highly variant, MKK4 and MKK5 are insufficient to describe the claimed genus.

Because the sequences are not described, the method of using the sequences to enhance resistance of plants to pathogens is likewise not described, and the specification fails to provide an adequate written description of the claimed invention.

Therefore, given the lack of written description in the specification with regard to the structural and functional characteristics of the compositions used in the claimed methods, it is not clear that Applicant was in possession of the claimed genus at the time this application was filed.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-2, 6 and 9-10 are rejected under 35 U.S.C. 102(a) as being anticipated by Yang et al (2001, Proc. Natl. Acad. Sci. 98:741-746).

Yang et al teach that tobacco plants transformed with a nucleic acid encoding a constitutively active form of the MAPKK NtMEK2 have activated defense responses (pg 744-745). This nucleic acid would encode a kinase domain of a MAPKK protein. This protein would inherently activate the PAL1, GST1, WRKY29 or PR1 promoters.

10. Claims 1-2, 6-7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Xing et al (US Patent 6,376,747, filed August 1999).

Xing et al teach that tomato plants transformed with a nucleic acid encoding a constitutively active form of the MAPKK tMEK2 are resistant to *Pseudomonas syringae* pv *tomato* (column 12, lines 58-63). This nucleic acid would encode a kinase domain of a MAPKK protein.

Claim Rejections - 35 USC § 102 / § 103

11. Claim 10 is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Xing et al (US Patent 6,376,747, filed August 1999).

Xing et al claims a method of increasing disease resistance in a plant by transformation with a nucleic acid encoding a constitutively active form of the MAPKK tMEK2 (claim 5).

The rejection is made because the Examiner cannot determine whether the prior art method possesses characteristics that are not recited in the art, that is activation of the PAL1, GST1, WRKY29 or PR1 promoters by tMEK2. The Examiner does not have sufficient facts to determine whether the claimed methods are inherently the same as the prior art methods. In addition, the Examiner cannot conclude that the claimed subject matter would have been obvious since it cannot be determined whether the claimed and prior art methods differ. Where the prior art product seems to be identical, except that the prior art is silent to a characteristic or property claimed, then the burden shifts to Applicant to provide evidence that the prior art would neither anticipate nor render obvious the claimed invention. See *In re Best* 195 USPQ 430, 433 (CCPA 1977).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 1-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xing et al (US Patent 6,376,747, filed August 1999).

The claims are drawn to a method of increasing disease resistance in plants by transformation with a nucleic acid encoding a kinase domain of a MAPKK protein, wherein the plants include crucifers and monocots, or to transformation of any plant with a nucleic acid encoding MKK4.

The teachings of Xing et al are discussed above. Xing et al do not disclose plants transformed with a nucleic acid encoding MKK4 or plants that are crucifers or monocots.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify the method of increasing disease resistance in plants as taught by Xing et al, to transform the plants with a nucleic acid encoding MKK4 or to transform a nucleic acid encoding a MAPKK into crucifers or monocots. One of ordinary skill in the art would have been motivated to transform the plants with a nucleic acid encoding MKK4 because of the suggestion of Xing et al to do so (column 6, lines 41-51). One of ordinary skill in the art would have been motivated to make pathogen resistant crucifers or monocots because of the economic importance of various crucifers and monocots, and because of the importance of Arabidopsis as an experimental organism.

Conclusion

14. No claim is allowed.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne R. Kubelik, whose telephone number is (571) 272-0801. The examiner can normally be reached Monday through Friday, 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg, can be reached at (571) 272-0975.

The central fax number for official correspondence is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

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Anne Kubelik, Ph.D.
August 16, 2006